

CLAIMS

We claim:

1. A method of responding to a customer communication, comprising:
 - receiving an utterance from the customer at an agent executing on a data processing system;
 - generating a response to the utterance received from the customer at the agent
- 5 based on a knowledge base that comprises information extracted from at least one exemplary conversation, wherein the at least one exemplary conversation comprises an exchange of utterances; and
 - sending the response from the agent to the customer.
2. A method as recited in Claim 1, wherein generating the response to the utterance received from the customer comprises:
 - analyzing the utterance received from the customer based on at least one of the following: at least one prior utterance received from the customer, at least one prior response sent from the agent to the customer, and the knowledge base that comprises the information extracted from the at least one exemplary conversation.
3. A method as recited in Claim 2, wherein the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer provide a contextual framework for analyzing the utterance received from the customer.
4. A method as recited in Claim 2, further comprising:
 - maintaining a conversation model having a current state that is representative of the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer; and
- 5 updating the current state of the conversation model based on the utterance received from the customer and the response sent from the agent to the customer.
5. A method as recited in Claim 2, wherein analyzing the utterance received from the customer comprises at least one of the following:

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recognizing the utterance received from the customer based on the knowledge base that comprises the information extracted from the at least one exemplary conversation; and

5 recognizing a part of the utterance received from the customer based on the knowledge base that comprises the information extracted from the at least one exemplary conversation.

6. A method as recited in Claim 5, wherein the utterance received from the customer comprises a plurality of data strings, and wherein recognizing the part of the utterance received from the customer comprises at least one of the following:

recognizing a sub-combination of the plurality of data strings based on the

5 knowledge base that comprises the information extracted from the at least one exemplary conversation; and

recognizing one of the plurality of data strings based on the knowledge base that comprises the information extracted from the at least one exemplary conversation.

7. A method as recited in Claim 5, wherein recognizing the utterance received from the customer comprises associating the utterance received from the customer with an information type that corresponds to at least one of a predefined information arrangement and a predefined information meaning.

8. A method as recited in Claim 5, wherein recognizing the part of the utterance received from the customer comprises associating the part of the utterance received from the customer with an information type that corresponds to at least one of a predefined information arrangement and a predefined information meaning.

9. A method as recited in Claim 2, further comprising:

sending the utterance received from the customer and the response sent from the agent to the customer to a customer service representative.

10. A method as recited in Claim 9, wherein the at least one prior utterance received from the customer and the at least one prior response sent from the agent to

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the customer provide a contextual framework for analyzing the utterance received from the customer, the method further comprising:

- 5 maintaining a conversation model at the agent having a current state that is representative of the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer;
- updating the current state of the conversation model based on the utterance received from the customer and the response sent from the agent to the customer; and
- 10 sending the current state of the conversation model to the customer service representative.

11. A method as recited in Claim 1, further comprising:

 receiving a notification from a customer service representative of intent to communicate with the customer.

12. A method as recited in Claim 11, wherein generating the response to the utterance received from the customer comprises:

- 5 generating at least one response to the utterance received from the customer at the agent based on the knowledge base that comprises information extracted from the at least one exemplary conversation; and wherein sending the response from the agent to the customer comprises:
 - sending the at least one response to the customer service representative;
 - receiving a selection of one of the at least one response from the customer service representative at the agent; and
- 10 sending the selected one of the at least one response from the agent to the customer.

13. A method as recited in Claim 11, further comprising:

 receiving a proposed response from the customer service representative at the agent;

- 5 determining if the proposed response is appropriate to send to the customer;
- sending the proposed response to a supervisor for approval if the proposed response is determined to be inappropriate; and

sending the proposed response to the customer if the proposed response is determined to be appropriate.

14. A method as recited in Claim 1, further comprising:
recording the utterance received from the customer and the response sent from the agent to the customer in a conversation log.

15. A method as recited in Claim 14, further comprising:
reviewing the conversation log to determine if the agent sent an improper response to the customer; and
editing the conversation log to correct the improper response if the agent sent
the improper response to the customer.

16. A method as recited in Claim 1, wherein generating the response to the utterance received from the customer comprises:

determining if the response to the utterance received from the customer can be generated at the agent based on the knowledge base that comprises information extracted from the at least one exemplary conversation; and

sending the utterance received from the customer to a customer service representative if the response cannot be generated at the agent based on the knowledge base that comprises information extracted from the at least one exemplary conversation; and

generating the response to the utterance received from the customer at the customer service representative.

17. A method of training an agent to respond to a customer communication, comprising:

compiling at least one exemplary conversation, wherein the at least one exemplary conversation comprises an exchange of utterances;

5 annotating the compiled at least one conversation to categorize information contained therein;

processing the annotated at least one conversation using a machine learning engine to populate a knowledge base.

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18. A method as recited in Claim 17, wherein annotating the compiled at least one conversation comprises:

presenting a user with a plurality of categories for annotating the at least one conversation; and

5 associating respective ones of the plurality of categories with respective parts of the at least one conversation based on user input.

19. A method as recited in Claim 18, wherein parts of the utterances comprising the at least one conversation comprise sentences and words.

20. A method as recited in Claim 19, wherein presenting the user with the plurality of categories comprises:

presenting the user with a plurality of categories based on intent for annotating the sentences; and

5 presenting the user with a plurality of categories based on semantic content for annotating the words.

21. A method as recited in Claim 19, further comprising:

verifying that all words that are determinative to the meaning of utterances comprising the at least one conversation are annotated.

22. A method as recited in Claim 17, wherein the at least one conversation comprises a conversation in which the agent was a participant.

23. A system for responding to a customer communication, comprising:

means for receiving an utterance from the customer at an agent executing on a data processing system;

5 means for generating a response to the utterance received from the customer at the agent based on a knowledge base that comprises information extracted from at least one exemplary conversation, wherein the at least one exemplary conversation comprises an exchange of utterances; and

means for sending the response from the agent to the customer.

24. A system as recited in Claim 23, wherein the means for generating the response to the utterance received from the customer comprises:

means for analyzing the utterance received from the customer based on at least one of the following: at least one prior utterance received from the customer, at least one prior response sent from the agent to the customer, and the knowledge base that comprises the information extracted from the at least one exemplary conversation.

25. A system as recited in Claim 24, wherein the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer provide a contextual framework for analyzing the utterance received from the customer.

26. A system as recited in Claim 24, further comprising:

means for maintaining a conversation model having a current state that is representative of the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer; and

5 means for updating the current state of the conversation model based on the utterance received from the customer and the response sent from the agent to the customer.

27. A system as recited in Claim 24, wherein the means for analyzing the utterance received from the customer comprises at least one of the following:

means for recognizing the utterance received from the customer based on the knowledge base that comprises the information extracted from the at least one exemplary conversation; and

5 means for recognizing a part of the utterance received from the customer based on the knowledge base that comprises the information extracted from the at least one exemplary conversation.

28. A system as recited in Claim 27, wherein the utterance received from the customer comprises a plurality of data strings, and wherein the means for

recognizing the part of the utterance received from the customer comprises at least one of the following:

- 5 means for recognizing a sub-combination of the plurality of data strings based on the knowledge base that comprises the information extracted from the at least one exemplary conversation; and
- means for recognizing one of the plurality of data strings based on the knowledge base that comprises the information extracted from the at least one exemplary conversation.
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29. A system as recited in Claim 27, wherein the means for recognizing the utterance received from the customer comprises means for associating the utterance received from the customer with an information type that corresponds to at least one of a predefined information arrangement and a predefined information meaning.

- 30. A system as recited in Claim 27, wherein the means for recognizing the part of the utterance received from the customer comprises associating the part of the utterance received from the customer with an information type that corresponds to at least one of a predefined information arrangement and a predefined information meaning.
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31. A system as recited in Claim 24, further comprising:
means for sending the utterance received from the customer and the response sent from the agent to the customer to a customer service representative.

32. A system as recited in Claim 31, wherein the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer provide a contextual framework for analyzing the utterance received from the customer, the system further comprising:

- 5 means for maintaining a conversation model at the agent having a current state that is representative of the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer;

means for updating the current state of the conversation model based on the utterance received from the customer and the response sent from the agent to the
10 customer; and

means for sending the current state of the conversation model to the customer service representative.

33. A system as recited in Claim 23, further comprising:

means for receiving a notification from a customer service representative of intent to communicate with the customer.

34. A system as recited in Claim 33, wherein the means for generating the response to the utterance received from the customer comprises:

means for generating at least one response to the utterance received from the customer at the agent based on the knowledge base that comprises information

5 extracted from the at least one exemplary conversation; and wherein the means for sending the response from the agent to the customer comprises:

means for sending the at least one response to the customer service representative;

means for receiving a selection of one of the at least one response from the
10 customer service representative at the agent; and

means for sending the selected one of the at least one response from the agent to the customer.

35. A system as recited in Claim 33, further comprising:

means for receiving a proposed response from the customer service representative at the agent;

5 means for determining if the proposed response is appropriate to send to the customer;

means for sending the proposed response to a supervisor for approval if the proposed response is determined to be inappropriate; and

means for sending the proposed response to the customer if the proposed response is determined to be appropriate.

36. A system as recited in Claim 23, further comprising:
means for recording the utterance received from the customer and the response
from the agent to the customer in a conversation log.

37. A system as recited in Claim 36, further comprising:
means for reviewing the conversation log to determine if the agent sent an
improper response to the customer; and
means for editing the conversation log to correct the improper response if the
agent sent the improper response to the customer.

38. A system as recited in Claim 23, wherein the means for generating the response to the utterance received from the customer comprises:

- means for determining if the response to the utterance received from the customer can be generated at the agent based on the knowledge base that comprises information extracted from the at least one exemplary conversation; and
- 5 means for sending the utterance received from the customer to a customer service representative if the response cannot be generated at the agent based on the knowledge base that comprises information extracted from the at least one exemplary conversation; and
- 10 means for generating the response to the utterance received from the customer at the customer service representative.

39. A system for training an agent to respond to a customer communication, comprising:

means for compiling at least one exemplary conversation, wherein the at least one exemplary conversation comprises an exchange of utterances;

5 means for annotating the compiled at least one conversation to categorize information contained therein;

means for processing the annotated at least one conversation using a machine learning engine to populate a knowledge base.

40. A system as recited in Claim 39, wherein the means for annotating the compiled at least one conversation comprises:

means for presenting a user with a plurality of categories for annotating the at least one conversation; and

- 5 means for associating respective ones of the plurality of categories with respective parts of the at least one conversation based on user input.

41. A system as recited in Claim 40, wherein parts of the utterances comprising the at least one conversation comprise sentences and words.

42. A system as recited in Claim 41, wherein the means for presenting the user with the plurality of categories comprises:

means for presenting the user with a plurality of categories based on intent for annotating the sentences; and

- 5 means for presenting the user with a plurality of categories based on semantic content for annotating the words.

43. A system as recited in Claim 41, further comprising:

means for verifying that all words that are determinative to the meaning of utterances comprising the at least one conversation are annotated.

44. A system as recited in Claim 39, wherein the at least one conversation comprises a conversation in which the agent was a participant.

45. A computer program product for responding to a customer communication, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

- 5 computer readable program code for receiving an utterance from the customer at an agent executing on a data processing system;

computer readable program code for generating a response to the utterance received from the customer at the agent based on a knowledge base that comprises information extracted from at least one exemplary conversation, wherein the at least one exemplary conversation comprises an exchange of utterances; and

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computer readable program code for sending the response from the agent to the customer.

46. A computer program product as recited in Claim 45, wherein the computer readable program code for generating the response to the utterance received from the customer comprises:

- 5 computer readable program code for analyzing the utterance received from the customer based on at least one of the following: at least one prior utterance received from the customer, at least one prior response sent from the agent to the customer, and the knowledge base that comprises the information extracted from the at least one exemplary conversation.

47. A computer program product as recited in Claim 46, wherein the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer provide a contextual framework for analyzing the utterance received from the customer.

48. A computer program product as recited in Claim 46, further comprising:

computer readable program code for maintaining a conversation model having a current state that is representative of the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer; and

computer readable program code for updating the current state of the conversation model based on the utterance received from the customer and the response sent from the agent to the customer.

49. A computer program product as recited in Claim 46, wherein the computer readable program code for analyzing the utterance received from the customer comprises at least one of the following:

computer readable program code for recognizing the utterance received from the customer based on the knowledge base that comprises the information extracted from the at least one exemplary conversation; and

computer readable program code for recognizing a part of the utterance received from the customer based on the knowledge base that comprises the information extracted from the at least one exemplary conversation.

50. A computer program product as recited in Claim 49, wherein the utterance received from the customer comprises a plurality of data strings, and wherein the computer readable program code for recognizing the part of the utterance received from the customer comprises at least one of the following:

- 5 computer readable program code for recognizing a sub-combination of the plurality of data strings based on the knowledge base that comprises the information extracted from the at least one exemplary conversation; and
- 10 computer readable program code for recognizing one of the plurality of data strings based on the knowledge base that comprises the information extracted from the at least one exemplary conversation.

51. A computer program product as recited in Claim 49, wherein the computer readable program code for recognizing the utterance received from the customer comprises computer readable program code for associating the utterance received from the customer with an information type that corresponds to at least one of a predefined information arrangement and a predefined information meaning.

52. A computer program product as recited in Claim 49, wherein the computer readable program code for recognizing the part of the utterance received from the customer comprises associating the part of the utterance received from the customer with an information type that corresponds to at least one of a predefined information arrangement and a predefined information meaning.

53. A computer program product as recited in Claim 46, further comprising:

computer readable program code for sending the utterance received from the customer and the response sent from the agent to the customer to a customer service representative.

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54. A computer program product as recited in Claim 53, wherein the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer provide a contextual framework for analyzing the utterance received from the customer, the computer program product further comprising:
- computer readable program code for maintaining a conversation model at the agent having a current state that is representative of the at least one prior utterance received from the customer and the at least one prior response sent from the agent to the customer;
- 10 computer readable program code for updating the current state of the conversation model based on the utterance received from the customer and the response sent from the agent to the customer; and
- computer readable program code for sending the current state of the conversation model to the customer service representative.

55. A computer program product as recited in Claim 45, further comprising:
- computer readable program code for receiving a notification from a customer service representative of intent to communicate with the customer.

56. A computer program product as recited in Claim 55, wherein the computer readable program code for generating the response to the utterance received from the customer comprises:

- computer readable program code for generating at least one response to the 5 utterance received from the customer at the agent based on the knowledge base that comprises information extracted from the at least one exemplary conversation; and wherein the computer readable program code for sending the response from the agent to the customer comprises:

 - computer readable program code for sending the at least one response to the 10 customer service representative;
 - computer readable program code for receiving a selection of one of the at least one response from the customer service representative at the agent; and

computer readable program code for sending the selected one of the at least one response from the agent to the customer.

57. A computer program product as recited in Claim 55, further comprising:

computer readable program code for receiving a proposed response from the customer service representative at the agent;

5 computer readable program code for determining if the proposed response is appropriate to send to the customer;

computer readable program code for sending the proposed response to a supervisor for approval if the proposed response is determined to be inappropriate; and

10 computer readable program code for sending the proposed response to the customer if the proposed response is determined to be appropriate.

58. A computer program product as recited in Claim 45, further comprising:

computer readable program code for recording the utterance received from the customer and the response sent from the agent to the customer in a conversation log.

59. A computer program product as recited in Claim 58, further comprising:

computer readable program code for reviewing the conversation log to determine if the agent sent an improper response to the customer; and

5 computer readable program code for editing the conversation log to correct the improper response if the agent sent the improper response to the customer.

60. A computer program product as recited in Claim 45, wherein the computer readable program code for generating the response to the utterance received from the customer comprises:

computer readable program code for determining if the response to the 5 utterance received from the customer can be generated at the agent based on the

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knowledge base that comprises information extracted from the at least one exemplary conversation; and

computer readable program code for sending the utterance received from the customer to a customer service representative if the response cannot be generated at

- 10 the agent based on the knowledge base that comprises information extracted from the at least one exemplary conversation; and

computer readable program code for generating the response to the utterance received from the customer at the customer service representative.

61. A computer program product for training an agent to respond to a customer communication, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

- 5 computer readable program code for compiling at least one exemplary conversation, wherein the at least one exemplary conversation comprises an exchange of utterances;

computer readable program code for annotating the compiled at least one conversation to categorize information contained therein;

- 10 computer readable program code for processing the annotated at least one conversation using a machine learning engine to populate a knowledge base.

62. A computer program product as recited in Claim 61, wherein the computer readable program code for annotating the compiled at least one conversation comprises:

- 5 computer readable program code for presenting a user with a plurality of categories for annotating the at least one conversation; and

computer readable program code for associating respective ones of the plurality of categories with respective parts of the at least one conversation based on user input.

63. A computer program product as recited in Claim 62, wherein parts of the utterances comprising the at least one conversation comprise sentences and words.

64. A computer program product as recited in Claim 63, wherein the computer readable program code for presenting the user with the plurality of categories comprises:

- computer readable program code for presenting the user with a plurality of categories based on intent for annotating the sentences; and
- computer readable program code for presenting the user with a plurality of categories based on semantic content for annotating the words.

65. A computer program product as recited in Claim 63, further comprising:

- computer readable program code for verifying that all words that are determinative to the meaning of utterances comprising the at least one conversation are annotated.

66. A computer program product as recited in Claim 61, wherein the at least one conversation comprises a conversation in which the agent was a participant.